

Patent Claims

1. Device for receiving and releasing free forms of energy by radiation, comprising a number of antenna elements arranged about a common axis with an electrical conductor each, whereby the antenna elements are divided between at least two groups provided on different parallel planes,

characterized in that

a said first group (O1, O3) has at least three said antenna elements (10, 13), which are arranged adjacent to one another in a distributed manner, namely, around at least one imaginary circle about a group axis, and each said antenna element (10, 13) of the said first group is electrically connected to a said antenna element (12) of a said second group (O2, O4) associated therewith.

2. Device in accordance with claim 1, **characterized in that** at least some of the said antenna elements (11, 12, 13) have an electrical conductor running in a spiral-like manner about an axis each.

3. Device in accordance with claim 2, **characterized in that** at least some of the antenna elements are designed as flat lines (Figure 4), which run in a spiral-like manner about a center each, whereby the electrical connection is made at the end of the line near the center.

4. Device in accordance with claim 3, **characterized in that** the flat lines are composed of straight line segments, which are often repeatedly offset by an angle, whereby the scale of the dimensions of these line segments gradually changes with the uniformly increasing distance from the center and all in all they form a continuous line. (Figures 4a, 4c)

5. Device in accordance with one of the claims 2 through 4, **characterized in that** at least some of the said antenna elements are shaped according to a spiral line running around a cone-shaped shell. (Figure 5)

6. Device in accordance with one of the claims 1 through 5, **characterized in that** at least some of the said antenna elements (13) have an electrical conductor consisting of interconnected, closed geometric figures each. (Figure 7)

7. Device in accordance with claim 6, **characterized in that** the geometric figures (13a, 13b, 13c) have a similar shape in the said antenna elements (13), but become smaller and smaller towards the center.

5 8. Device in accordance with one of the claims 1 through 7, **characterized in that** the said antenna elements (10, 11, 12) of the first and second groups are arranged in pairs congruent to one another - optionally with reverse orientation - in the different group planes.

10 9. Device in accordance with claim 8, **characterized in that** the said antenna elements (10, 11, 12) of the first and second groups are arranged about a common group axis and are each oriented offset against an adjacent element of the same group by an angle that corresponds to the offset angle about the group axis.

15 10. Device in accordance with claim 9, **characterized in that** the said antenna elements (10, 11, 12) of the first and second groups are arranged offset to one another about a common group axis by equal angular distances and at a constant distance to the group axis.

20 11. Device in accordance with one of the claims 1 through 10, **characterized in that** the said first and second groups (O1, U1; O2) are arranged on said different plates (1, 2) that are parallel to one another, and the electrical connection of the said antenna elements (10, 11, 12) of both said groups corresponding to one another is made by means of said electrically conductive connection pieces (3), which at the same time mechanically stabilize
25 the said plates (1, 2) in relation to one another.

12. Device in accordance with claim 11, **characterized in that** the connection pieces are shaped at least partially as a said spiral line (63) running around a cone-shaped shell.
(Figure 6)

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13. Device in accordance with one of the claims 1 through 12, **characterized in that** the said first group (O1) is arranged on one side of a said plate (1), on the opposite side of which is arranged a said third - different from the first and second groups - group (U1) of said antenna elements (11), which are electrically connected to the respective,
35 corresponding antenna elements (10) of the first group.

14. Device in accordance with claim 13, **characterized in that** the said antenna elements (11) of the third group have a direction of winding that is opposite that of the said antenna elements (10) of the first group.

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15. Device in accordance with one of the claims 1 through 14, **characterized in that** the number of said antenna elements (10, 11, 12) in a group is even-numbered, and particularly four or eight.

10 16. Device in accordance with one of the claims 1 through through 15, **characterized by** a said housing (G), which is electrically separated from the said antenna elements (10, 11, 12).

15 17. Device in accordance with claim 16, **characterized in that** the said housing (G) has a concave top side and bottom side.